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UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

BRANCH OF RESEARCH

MONTHLY REPORT

OF

DENDROLOGY
FOREST EXPERIMENT STATIONS
FOREST PRODUCTS
FOREST ECONOMICS
GRAZING RESEARCH

March, 1927.

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BRANCH OF RESEARCH

March, 1927

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FOREWORD

SOME OBLIGATIONS OF THE SCIENTIST

By Carleton R. Ball
Agronomist, U. S. Dept. Agric.

(An address as retiring President of the Washington Chapter of Phi Kappa Phi, May 11, 1926.)

ACCURACY

It seems almost absurd to insist that the worker in science should be accurate. One might well say that if a scientist is not accurate he is not truly a scientist. To question his accuracy is like casting doubt on the regularity of Earth's rotation or the precession of the equinoxes (whatever that is). Accuracy, however, is more a matter of habit than of ability. Not even all scientists have perfect habits. Of course, not all scientists have been in business quite as long as the earth has been revolving, and so may not have had time to get their habits permanently fixed. They must strive mightily to achieve. It is not enough to intend to be accurate. Good intentions often are but paving stones for Hades and other hot places.

Lack of accuracy is evidenced in many ways. It may appear as misspelling of the names of persons, or as maddening mistakes in citations of publications. It may be found in misquotations of text. Sometimes it takes the form of a negative statement when the positive was intended, or vice versa. More commonly it occurs as errors in tabulated data, as in additions of totals or in computations of averages and percentages.

Whatever the form of the inaccuracy, there can be no doubt of the effects. First, it begets doubt as to the validity of the conclusions. This doubt may cover only the extent to which the error affects the results. The doubt may extend much farther and become a conviction that undetectable errors exist in the paper, and destroy its value. Second, discovered inaccuracies lower the reputation of the writer. Third, published inaccuracies reflect discredit on the institution with which the writer is connected.

INTEGRITY

The scientist, like Caesar's wife, must be above suspicion in matters of ethical or moral standards. His findings must be free from any possible taint of commercial bias. This must be so even if his support be derived in whole or in part from commercial sources. Above all, he must be free from any well-founded suspicion of faking his results. Of all persons, the scientist can least afford to sell his birthright for a mess of pottage. The illustrious Swedish chemist, Berzelius, is quoted recently as saying: "The first and greatest glory of an investigator is his truthfulness and conscientiousness; all his scientific attainments are eclipsed by these qualities."

There has just passed from the stage a tragic figure. On the basis of one-time real achievement and more recent skillfully-prepared publicity, he has been widely acclaimed as a great leader in one branch of creative science. It is well known among scientists that he has capitalized this reputation successfully to deceive and defraud the public through the sale of faked material. Across the ocean, an international figure in the physical sciences has been dismissed in disgrace from an old and honored university for acts involving moral turpitude. The injury and loss to the individual and his institution are great, but the loss to the reputation of science in the public mind is far greater.

Should the public become convinced that there is wholesale fraud in science, and widespread moral breakdown among scientists, the way of the transgressor may indeed be made hard, but also the way of the honest and true will be made ten times harder. The remedy obviously is education. Dr. Slosson says: "The true function of education is the cultivation of the faculty of prevision. . . . . You should be able to distinguish between a rising statesman and a false alarm."

IMPARTIALITY

At first glance, it may seem that this attribute really is a part of integrity. The distinction may be made clear. Integrity is honesty, moral soundness, rectitude. It implies knowledge of right and wrong, and a conscious or deliberate choice of right. Impartiality is absence of inherent but unconscious bias, prejudice, or favoritism. It is the judicial attitude in contrast to the prejudicial attitude. The scientist must go much farther than the candidate for office who promised, if elected, "not to lean toward partiality on the one hand or toward impartiality on the other."

But what prejudices of a scientist can affect his scientific conclusions, you ask? Well, suppose he were a psychologist making a study of racial or national intelligence. Suppose further that he had a strong prejudice against Frenchmen, or Negroes, or Chinese. Unconsciously, he would underrate the achievements of their representatives and so arrive at biased conclusions. Some would urge that, while this bias might be possible in psychology or anthropology, it could never occur in the case of the physical sciences or the larger biological sciences. No man is likely to be prejudiced against chemical elements or particular plants or animals. True, but these are not the only biases. There easily may be a prejudice in favor of a given theory of cause or relation. More subtle still, and also more common, is the bias in favor of one's self or one's own theories, ideas, or accomplishments. The temptation is to strive to see what we wish to see. The wish is father to the thought.

Cases are not unknown where men have seized upon a theory as a probability and thereafter have accepted all results favorable to that theory and tended to neglect or ignore all results not in accord with it. Furthermore, they may become so wedded to a hypothesis as to neglect the obvious checks and controls of experimentation.

At the meetings of the American Association for the Advancement of Science a few years ago, a tremendous ovation was given to the young author of a paper apparently marking a striking advance in a new field of biology. The applause lasted for minutes. No such acclaim had greeted any other presentation in biologic science in half a century. And yet within a few short weeks, a critical study of control material indicated that the supposed new discovery was only a misinterpretation of normal conditions.

Such neglect of check or control studies is not a conscious stultification of the intelligence but an unconscious bias in favor of one idea as against another. It is dangerous because insidious and should be battled vigorously. The scientist, above all others, must represent the league of the open mind. Faraday, the physicist, states the obligation clearly.

The philosopher should be a man willing to listen to every suggestion, but determined to judge for himself. He should not be biased by appearances; have no favorite hypothesis; be of no school; and in doctrine have no master. He should not be a respecter of persons, but of things. Truth should be his primary subject.

CLARITY

Clearness in expression is a pearl of great price. It almost may be called the sine qua non of writing. It is worthy of long and intense pursuit. Confusion in writing may result from inability to use language skillfully, or from lack of perception of what needs to be told. In the first case it betrays lack of preparation. In the second it indicates a kind of selfishness.

Consider lack of preparation for clear writing. No investigator is willing that another shall write his results. No other should be willing to do so except on terms of joint authorship. Research and writing can not be dissociated. Therefore the obligation for clarity must be on the investigator. Language is a kit of tools for the expression of ideas. Clarity demands ability to use these tools skillfully. Would you employ a plumber who could pipe your house for water but could not thread the pipes or make the joints water-tight? Not long!! Would you pay full wages to a carpenter who could devise a needed cabinet but could not use square or plane or chisel with precision? Not at all! Is the simile too farfetched?

Lack of clarity may arise from the use of unfamiliar terms and similes. It may come about from long and complex sentences in which the effect of modifiers is misplaced. It may be the result of using words which fail to give the exact shade of meaning desired. It may arise from the unrecognized omission of data wholly familiar to the writer but naturally unknown to the reader.

Not long ago a paper discussing a certain organism referred to it as "bun-shaped." If each lady present were to draw a picture of her image

of a bun, we should find very wide variation in form. There are definite terms descriptive of every conceivable form. How much better to use the correct term! A recently published paper is of great international interest because concerned with the important but puzzling virus diseases of plants, possibly comparable to such diseases of humans as yellow fever, spotted fever, sleeping sickness, and others. In this paper certain forms of a supposed causal organism are described as "pumpkin-seed-shaped." To the reader familiar with pumpkin seeds this is clear; to others not. If not, where can one go to learn the shape of a pumpkin seed? Think for a moment also of foreign readers who do not know the pumpkin by its English name, but do know descriptive terms based on Latin roots. How much clearer to have said "broadly elliptical" or "narrowly obovate," or whatsoever was accurately descriptive.

A cynic has said that language was given man to enable him to conceal his thoughts. Sometimes it appears as if the cynic were right. Dare I ask the members of this distinguished company if they have had recent experience in being unable to find the meaning of an author by what he wrote? The prayer of the Scottish poet: "O wad some power the Giftie gie us, tae see oursels as ithers see us" might well as be the daily petition of every scientist who speaks or writes.

In our capital city and elsewhere, laws provide severe penalties for persons whose automobiles carry any device for producing a smoke screen. Is legislation needed to penalize such devices on fountain pens or typewriters?

SCHOLARSHIP

By scholarship I mean not so much rank of achievement as studiousness. Senator Woodbridge N. Ferris, of Michigan, is founder of the famed Ferris Institute. He devotes most of his time to education when he is not senating. In a recent address he said that when a man has ceased to study he is dead. The Senator added that a lot of persons in that condition do not know they are dead, and so insist on hanging around and getting in the way of the live ones.

None can question the obligation on the scientist to pursue studies so long as he shall live. He is not like the small-town youth who went into the city to read law with a great jurist. After a week he returned to his own community. On being asked how he liked law, he replied, "Taint what it's cracked up to be. I'm sorry I learnt it." We have it, on the word of many educators, that the sciences are not cultural subjects. We would not start an unseemly argument with our pedagogic betters. Rather would we declare that, as the arts should know more science, so the sciences should know more of language, literature, history, and art.

There is also upon the scientist an obligation to encourage habits of study in others, especially his younger associates. Like accuracy, studying is much a matter of habit. Example and encouragement go far. The ultimate effect is great. There are no royal roads and few short cuts. Application, industrious and long-continued, is what counts.

PUBLICITY

The scientist ought to be human. Usually he is. In the popular conception, however, he is a weird creature characterized by long whiskers and long words. He delves into abstruse mysteries and shuns his fellows. We know better, but much of the public does not. If the scientist needs more appreciation as a member of the human family, obviously he should strive to be more broadly human in his sympathies and interests. Thus will he best serve his science and himself.

True science needs more legitimate advertising to the people. She needs to sell her wares in the public market as well as on the stock exchange. She needs to be known and loved of the man at the desk, the man at the machine, and the man in the street. The present Secretary of Agriculture coined an apt phrase at the beginning of his official career. He said that the farmer's need was to become articulate. Science has urgent need to become articulate in popular speech.

Science, however, has not been without her apostles. There always have been those who have stirred the imagination of the people. In our own times, Slosson made chemistry speak in the language of the day. Now he is striving to do for all science the same service he first rendered to chemistry. But one man, at best, is but a voice crying in the wilderness. And the wilderness is very, very big, and, by comparison, the voice is very, very small. Multiply one voice by the total number of the devotees of science and the story can be told to the whole world.

Science is receiving great subsidies. She has need of greater, that the scientist may enter upon greater labors, and produce greater and more universal results. Of funds there is no lack. Money is being poured out by billions on those objects which most interest the possessors. Let scientists but make their discoveries of absorbing interest and the billions shall be theirs. The challenge is clear, the opportunity unrivaled, the obligation paramount.

CONCLUSION

The scientist is slowly unraveling the tangled and broken threads that were the warp and woof of the fabric of our past. He is helping to brighten and to broaden present-day life in a thousand definite but often unrealized ways. He is working behind the scenes with the Creator for a still more glorious future. He thus stands before the world as the interpreter of what has been, the worker of the myriad miracles that are, and the prophet of undreamed things to come. With high ideals he shall labor, and from balanced judgments he shall speak in clear and simple words the marvelous truths on nature and of God.

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FORESTS AND STREAMFLOW

C. G. Bates

Since the denudation of one of the watersheds at Wagon Wheel Gap in 1919-20, there has been plainly apparent an excess of discharge from this watershed as compared with the flow from the undisturbed watershed. The inclination has been to assume that this arose from the practical cessation of transpiration with removal of the trees, especially so since in the last two years, with the return of some aspen growth, the excess had largely disappeared. This looked very bad for any form of tree growth, especially in a region where most of the streams are completely utilized, at least in the summer, for irrigation.

The average excess of water for the seven years since denudation has been about 0.95 inches over the watershed, compared with a delivery by the undisturbed watershed of 6.1 inches or 29 per cent of the precipitation. It has now been possible to show that the great bulk of this excess flow is delivered before the crest of the spring flood and therefore must represent a saving in some way effected during the winter period of snow accumulation. The flow is, however, above par throughout the summer, fall, and winter, as might be expected if there were more snow to melt and go into the ground during the snow-melting period, but there is no evidence of further water being saved for streamflow through the summer: quite the contrary, it appears that summer evaporation and transpiration after denudation must have been fully as high as the total loss when trees were demanding their share.

One of the very fine points to be observed is that to maintain even the normal summer streamflow it is essential that the soil, after denudation, be receptive enough to absorb at least the normal amount of water at the time of snow-melting. The soil of the Wagon Wheel Gap area is very porous and receptive even where there is no vegetative mulch: we are well aware that under many conditions this is not the case. It therefore requires no stretch of the imagination to conceive the situation in which any saving effected during the winter (in a snow region) means only excess flow in the flood stage and will not result in a high flow maintained throughout the year.

The further point which more recent study has brought forth is that the seven-year cycle of excesses, which we took to represent a cycle caused by the return of a light aspen cover, is at least in part, and probably almost wholly a climatic cycle; that is, the first four years after denudation had considerably more than the normal snowfall, resulting in a cumulative excess which reached its peak in the third year. The last two years were decidedly deficient in snowfall and there was very little excess streamflow. These are the facts which lead the trail of causes of excess straight back to interception of snow by coniferous crowns. It may be roughly computed that for the average of the seven years crown interception accounts for the loss of 2.5 inches of water, but this is balanced

by a saving of 1.5 inches from the protection afforded to that snow which reaches the ground. This is largely inference, but the further fact is noted that when the snowfall amounts to less than seven inches of water (the normal here being 11.5 inches) the loss by interception is of course small and will be balanced by evaporation losses from unprotected snow. This seems reasonable in view of the fact that deep blankets of snow undoubtedly suffer much less evaporation, proportionately, than small, broken patches.

And all of this, by the way, is a very good argument for the value of our aspen stands as watershed protectors. Common observation should have told us this, but it seems to have required the inferences from statistics to call it to the front. Bare limbs intercept very little snow, yet both the shade and the soil conditions under aspen may be almost ideal for slow melting and complete absorption. Melting may not be delayed as late as the last patches of snow in coniferous timber, but the total yield of water from the aspen will be greater, if our inferences and observations are correct.

As to the regulatory effect of a mixed aspen and coniferous forest, there can be no doubt. Streamflow was increased almost 50 per cent during the early-melting period and about 55 per cent at the peak of the flood, partly due to earlier and more rapid melting, and partly to the large amount of snow to be melted on the denuded watershed. Erosion was increased at least eight times, principally in the flood period of each year. A single rain that caused appreciable erosion from the denuded watershed yielded only 1/20 as much from the forested one.

In brief then, the West must face the fact of decreased but better-regulated streamflow as the result of its mountain forests. By pinning the cause down to snow-interception we have given a basis for estimating the possible effect under different climatic conditions and with different kinds of forests. By showing that any excess flow outside the flood period is dependent on absorption conditions, we have made it possible to apply these results to other soil conditions. We propose the ratio

$$\frac{\text{high stream stage}}{\text{low stream stage}}$$

as a measure of the need for the protective influence of a forest under any given conditions, as this ratio seems to sum up all of the factors which bear on the subject. At Wagon Wheel Gap this ratio was 10:1 with forest and 15:1 after denudation. Both of these values are extremely low, as examination of any complete streamflow records will show, and bear witness to the very porous character of the rocky soil with which we were dealing.

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DENDROLOGY

Federal Horticultural Board Activities

During the fifteen years the Federal Horticultural Board has been operating it has not until recently had the good fortune to intercept at a port of entry a foreign shipment carrying an unknown dangerous insect pest or plant disease. So far the Board has dealt entirely with the control of pests and diseases that have gained entrance and become established here before the Board was organized.

Strangely enough every insect pest and plant disease now known in this country has been brought here on some imported living plant or on some form of commercial fruit, raw material for manufacture here, such as broom-corn and cotton, packing material, such as cotton lint, rice-straw, etc., or in foreign soil about the roots of plants and even as pure balast dumped upon our shores by foreign ships. Had the Department of Agriculture known years ago what it knows now regarding the dangerous insect pests and plant diseases likely to be introduced into this country, as well as the numerous ways of bringing them in, aside from with and on the imported plants, horticulture and agriculture in the United States could have been saved millions of dollars in losses now caused by these pests and diseases. Practically all of these enemies were admitted through ignorance, which is now being supplanted by technical knowledge that enables Department experts to guard against such dangerous imports.

An interesting example of the efficiency with which our ports of entry are now being guarded came to light recently at the port of New York. A shipment of 450,000 pounds of turnips from Holland was held for inspection, which revealed the presence of a new and unknown insect pest so cunningly hidden in the cuticle of the turnips as to easily escape detection. The insect (beetle) lays its eggs in the tender epidermis of the growing turnip and the larvae remain imbedded in the flesh of the turnip, soon forming wart-like excrescences the size of a pea, of which there may be 15 or 20 on a single turnip.

Now that corn ensilage has so largely displaced the growing of turnips here as cattle food in the dairy districts, the damage this turnip pest could do would be relatively small. The turnip is raised here now only as a vegetable for human food, and this is a relatively small and unimportant industry. But as the insect also attacks other members of the turnip family (Cruciferae), its establishment in this country would cause tremendous losses in our cabbage-growing industry, which is extensive and very important.

It is needles to say that the Board ordered the Holland shipment of turnips deported, and a special embargo will be issued shortly permanently shutting out foreign-grown turnips from this country.

This turnip pest is known as the Turnip Weevil (Ceuthorrhynchus pleurostigma) and it has been known for over 75 years in England and western Europe, where it is a serious cabbage and turnip crop-pest.

American Tree Association's Tree Planting Book

Proof-sheets were recently received for review of the American Tree Association's Tree Planting Book, designed for free distribution to people interested in knowing what sorts of native and foreign trees can be successfully grown in different parts of the United States, and how to plant them.

The desire of the Association to supply the public gratis with this information is commendable and certainly will be appreciated. The essentials of handling and planting are satisfactorily covered in a popular way so that the layman is fully informed. The subject of pruning roots and crown is discussed, with the aid of diagrams, so that the beginner may understand the object and necessity of such preparation of trees previous to and following planting. Little could be suggested for the improvement of this part of the book, because the mechanical part of tree planting is now fully discussed in a number of available text-books.

Coming, however, to advice as to what species of native and foreign trees are suitable for planting throughout the United States, the author of the book attempted an enormously difficult piece of work, particularly with regard to sections of the country where but few trees grow naturally. Within the naturally forested regions in eastern and western United States advising the tree planter as to what species to choose is not difficult, because of the large number of different trees growing there naturally. In sections of the country, however, where few or no trees are found, and for this reason the people living there are keenly interested in growing trees, advising what to plant is really difficult, because there are few if any actual trials on which to base the advice. In hot desert regions of inadequate rainfall it is often well nigh impossible safely to recommend planting any sort of tree. The natural tree growth there is confined chiefly to Cactus, Spanish Bayonet, Catsclaw, and Mesquite, few if any of which would be acceptable. With an abundance of irrigation water, not always available, some form of native cottonwood might be used. Likewise, in the cold wind-swept northern central prairie sections few or no trees grow naturally because of the severe climatic conditions. Advising the planting there of really desirable eastern trees, as is done in this book, would seem to be too risky, because we have no successful trials on which to base the advice. Advising planting in what are probably impossible regions may be regarded as experimental ventures, which are possibly better than passing these regions over entirely. It is important, however, to recognize that successful tree planting in all parts of the United States may be worked out on paper, but the practical accomplishment of the planting may be questionable. In difficult or impossible regions for tree planting the advice given in this book is likely to be disappointing when tested. It is, however, next to impossible in the present state of our knowledge, to present a scheme for tree planting in all sections of the country that shall be bullet-proof.

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FOREST EXPERIMENT STATIONS

Washington

General

Mr. Demmon, after spending more than two months in Washington, joined an Appalachian party making an extensive survey of cut-over lands in the pine section of Virginia, and will participate in that for a couple of weeks before returning to the Southern Station. Mr. Eyre is also a member of this party and he plans to continue with it for several weeks.

Bruce left the Service on extended leave until some time late in the fall.

Examination Papers

About 160 boys took the junior forester examination this year, some schools showing a striking increase in the number taking the examination, while in others, there appeared to be a marked reduction. Several members of the Branch of Research assisted in the grading of papers.

Mensuration

The Office of Measurements has prepared for printing a basal area graph paper for plotting tree tapers and measuring volumes by planimeter. It is expected that this form will be ready for distribution by June. The paper has been so devised that a single form can be used for plotting trees of any diameter with all requisite accuracy, and without the use of auxiliary scales.

The yield study for the western white pine stands continued to engross the attention of the entire section, and little outside work was allowed to interfere with the progress of the study. Haig had expected to get back to Missoula before now, but still is grinding out charts, figures, and tables of all kinds. Short cuts have been devised, greatly speeding the work, but the whole problem can not be solved by short cuts alone.

Forms

Form 44-SI is now being printed and will soon be available on requisition from Ogden.

Library

During March there were 1203 loans of books and periodicals from the library, and 165 members of the Service and others consulted the library in person.

The number of books and periodical articles indexed for the card catalogue last month was 240.

LAKE STATES FOREST EXPERIMENT STATION

Zon spent three weeks in Washington, primarily in connection with the editing of three manuscripts for Department publication, namely, "Timber Growing and Logging Practice in the Lake States," "Forest Planting in the Lake States," and "Yield of Jack Pine in the Lake States." Advantage was taken also of the opportunity to discuss the Station's program with members of the Branch. He addressed a family gathering of the Forest Service at the National Museum on the subject, "What is a Forest?" As a result of his strenuous life, he returned to the Station a near wreck.

Mr. Pinchot addressed the Wisconsin Legislature at Madison on conservation, Zon taking part in conferences with the Governor and other State officials on matters of State forest policy.

A committee of the Minnesota State Legislature has drafted and had introduced six bills relating to forestry matters, partly a result of conferences attended by Zon. The subjects included are the appointment of an interim committee on reforestation, the disposal of cut-over lands delinquent for taxes, the establishment of State forests, and forest taxation. The bill providing for the production of nursery stock by the State has been abandoned because of the threat of the nurserymen to oppose all other forest legislation.

Mr. Marsh spent one day with us discussing Station problems. Dr. Schenck visited the Station for part of a day on his way east and emphasized how little they know in Germany about silviculture, even after years of experiment and experience, and recommended that all texts on silviculture, based on European experience, be burned, and that in the United States we must build our own new silviculture.

We regret the necessity of reporting the resignation of A. E. Wackerman, who is leaving to become forester for the Crossett Lumber Company at Crossett, Arkansas. The regret is only partially compensated by the thought that he will increase the ranks of the foresters in the South, and that although he will be employed by a commercial company his work will keep him in close touch with that of the Southern Experiment Station. Another case of concrete interest in forestry and selective logging in the region is provided by the appointment of H. F. Maturen, formerly of the Minnesota Forest School, a temporary employee at the Station, and more recently in the State Forest Service of Alabama, as forester for the Goodman Lumber Company in Wisconsin, under the technical direction of Mason, Stevens, and Bruce.

J. L. Averell has been appointed to fill one of our vacancies, effective May 15, and W. W. Chase, a graduate student in forestry at the University of Minnesota, was employed as a temporary assistant during the month.

Since his return to the office, Zon has been working with Garver and Gevorkiantz on the preparation of the manuscript on the Relative Costs of Logging Large and Small Timber.

The tabulation of the permanent sample plot data for the aspen conversion plots and the red pine cutting plots was completed. An article was prepared by Kittredge as a final report on the 20-year red pine thinning project on the Minnesota Forest, in which the results of the thinning were brought out and comparisons made of the growth on these plots and in plantations of corresponding ages with relation to density. Wackerman again rewrote his manuscript on the Yield of Jack Pine in the Lake States and forwarded it to Washington. He has been cleaning up various odds and ends so that work on which he has been engaged may be in good shape for whoever takes it up.

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APPALACHIAN FOREST EXPERIMENT STATION

General

March saw the completion of three reports and the beginning of field work. McCarthy finished his report on yellow poplar for review and Korstian that of southern white cedar. Frothingham submitted recommendations for four branch stations, based on a division of the Station's territory into sub-regions and an analysis of topography, soil, and climate. These branches are Bent Creek, on the Pisgah National Forest near Asheville, the Berea College Forest at Berea, Ky., points on the Shenandoah National Forest accessible from Edinburg, Va., and the West Virginia State Forest and part of the Monongahela National Forest accessible from Marlinton, West Virginia.

Major Stuart and Assistant District Forester Scott visited the Station on the 17th and addressed a group of twelve foresters, located at Asheville, on plans for the development of public relations work. Major Stuart gave a short talk at the Asheville Rotary Club, as a result of which Frothingham was invited to organize a series of radio talks from the new Asheville Station, WWNC, in the month of April and later.

McCarthy addressed the Civitan Club of Canton, N. C., Haasis spoke on "The Study of Growth Rings of Trees" at a meeting of the Journal Club of Johns Hopkins University, and Frothingham read a paper on "Forestry Possibilities in Southern Appalachian Hardwoods" at the Ninth Southern Forestry Congress at Jacksonville. The Jacksonville meeting was well attended and the program was well arranged with many worth while papers, that by Colonel Greeley being unusually stimulating.

From Jacksonville, Frothingham went to Starke, Fla., where he spent two days with Wyman and Dr. Gerry, visiting the Southern Station's turpentining experiments. A trip was made to Gainesville to visit the Florida Agriculture Experiment Station.

Loblolly Pine Study

Korstian left Asheville on the 23rd for Norfolk where he attended a meeting of the Southern Pine Association. He then went to Washington

to discuss plans for the loblolly pine work with Munns and Demmon, returning to Petersburg where he joined Dr. Hursh and Supervisor L. S. Gross. The first work done was the establishment of sample plots on the Lee group of National Forests. Korstian will be joined later by Demmon, Eyre, and Frothingham.

Oak Growth and Yield Study

The oak study took the time of Buell and two assistants during the early part of the month. Computations of the white oak and black oak stem measurements were completed and this material was put through the card machine in Washington and returned. The work was temporarily discontinued in order to map the Station forest.

Work on the Station Forest

Good opportunities for mapping the thousand-acre Bent Creek Forest were presented by a spell of good weather and the leafless condition of the trees. The map will divide the tract into site, age class, and type units, and will provide a basis for management. The immediate need for activities of various sorts on the Station forest makes it necessary that such a plan shall be preapred at an early date.

Planting

Korstian and Frothingham visited the Champion Fibre Company's nursery at Canton, N. C., to inspect planting stock and determine the amount and kinds available for this spring's planting. They also visited Bent Creek to locate areas for the plots to be made there. Korstian, Hursh, and Sims visited the Mount Mitchell planting area and determined the location for planting plots to be put in on Clingman's Peak. Sims later returned with assistants and put in six chain square plots of 100 trees each. Four species were used - western white pine, white fir, white spruce, and Japanese red pine. The white fir was obtained last year from the Pike National Forest and was taken from the transplant beds at Bent Creek. The other species were grown at Canton, N. C. This brings the total number of experiment plots in the Mount Mitchell planting area to 53.

At Bent Creek, red pine obtained last year from Pennsylvania was set out adjacent to the existing plots of the same species from New Hampshire and Minnesota. Small plots of Sitka spruce, red pine, western white pine, incense cedar, lodgepole pine, southern and northern white cedar, hard maple, and cascara buckthorn were established in the Bent Creek arboretum.

In order to try out the Bent Creek bottoms as to nursery possibilities, small seed and transplant beds were established in three locations. Species were used which will require the least amount of water and care.

At a conference with Frothingham during the month, Supervisor Mattoon of the Pisgah Forest brought up the possibility of a nursery at Bent

Creek for the supply of planting material for the Pisgah and nearby National Forests. The Bent Creek bottoms would be an excellent place so far as location is concerned. It is the purpose of the experimental beds to determine whether nursery work is feasible in these bottom lands which may turn out to be subject to frost injury.

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SOUTHERN FOREST EXPERIMENT STATION

General

The Ninth Southern Forestry Congress met at Jacksonville on March 22 and 23, and the Station was represented by Wyman.

The partially organized Gulf States Section of the Society of American Foresters met at Jacksonville in connection with the Congress, Forbes being elected Chairman.

Assistant Forester Kneipp, and Assistant District Forester Ashe arrived from Washington toward the end of the month to look over possible National Forest Purchase Areas in west Louisiana and the Florida parishes. Forbes spent three days in the field with them near Alexandria.

Pessin prepared a "Syllabus for Forest Ecology for the Southern States" with copies enough for all the Station staff. This is designed to prompt systematic note-taking on a number of points of interest throughout our region and at all seasons of the year, to give us a more comprehensive record of the ecological factors affecting forestry practice.

Measurements

Ostlin spent the first half of the month on the longleaf accelerated growth study. He completed the individual analyses of the fifty trees measured, and continued the final analyses noted last month. He prepared a valuable outline of the work done to date, as a guide for the completion of the study. Ostlin's analyses continue to show a remarkably good agreement between the diameters obtained by Hojer's formula and the average diameters determined in the field, and it seems fairly certain that in the material studied little reduction in form class has occurred with the acceleration of growth after cutting. Ostlin has now left us for the Lake States and the Pacific Coast, after a two months' stay which provided several of us with a liberal education in forest mensuration.

Management

Tree descriptions and cone counts were taken in an attempt to find out what constitutes a seed tree on the Choctawhatchee Division of the Florida. Some data were obtained on the survival of seedlings within the root zones of seed-producing trees, both under and free from oak brush, and an attempt was made to determine the space requirements of trees of various sizes. A 10 per cent cruise of 20 acres of timber being turpen-

tined for the first time this year was made, to determine the number of turpentine faces per acre on trees of various sizes, and the area not actually used by chipped trees but nevertheless subjected to annual fires under the current practice of raking and burning turpentine stands. As few as three faces per acre were discovered in some instances, the trees occupying perhaps as little as 1/10 of the total area burned.

Paul and Weinstein, of the Madison Laboratory, have installed their irrigation system on their ten-acre plot on the Choctawhatchee and in addition to watering certain trees have given others a straight nitrate fertilizer and still others a complete fertilizer, in an attempt to discover the factors influencing development of woody tissue. Advantage is taken of their tests to study the effect of irrigation and fertilizing on seed production and where possible on seedling survival and development.

Naval Stores

The month at Starke was marked by scribing and measuring faces, renumbering trees, raising tins and hanging cups, and the commencement of chipping.

Wyman spoke briefly on the naval stores work before the Ninth Southern Forestry Congress and extended an invitation to the members of the Congress to visit Starke. About forty members of the Congress, including Captain Eldredge of the Superior Pine Products Company, Senator Fletcher, Congressman Green, State Senator Knight, and State Representative Thomas, accepted the invitation. All expressed great interest in the work as they saw it on the ground. Other guests at Starke during the month included Dr. Craighead and Mr. J. A. Beal, of the Bureau of Entomology, E. H. Frothingham, and Miss Gerry.

Forestation

Wakeley and Barrett commenced the annual reexamination of the experimental plantations at Bogalusa. The most interesting tendency noted is that of the slash pine seedlings damaged by rabbits in the year of planting to lag far behind the rest of the plantation in height growth.

Wakeley, with Miss Regan's assistance, made a good start on the summation of germination and mortality in the nursery beds for the past four years. These summaries will, in a number of instances, supplement germination tests conducted by ourselves and cooperating universities, and will thus have a bearing on the seed testing work as well as on nursery practice.

An interesting although unfortunate occurrence marks the attempt to establish longleaf pine in seed spots on the Choctawhatchee. Germination was excellent, but had no sooner taken place than black ants removed practically every cotyledon from the seedlings, killing them at once. This may throw some light on the extremely poor natural regeneration on the Choctawhatchee.

Protection, Others

Grazing. Pessin and Hoffman continued last month's work on the project at McNeill, completing the examination of the quadrats in the unburned half of the pasture. A collection of the plants now in flower on a number of quadrats was made at the time of examination. In connection with the quadrat examinations, Pessin designed a new form for the field notes, which includes four years' records on a single sheet, and should greatly facilitate year by year comparisons as well as speed up the field work. Study of the grazing project records to date shows surprisingly little change in either density or relative abundance of the grasses on the quadrats in any of the four conditions existing on the pasture since the establishment of the experiment.

Diseases. The chief victim of rusts appears to be longleaf, and considerable question has arisen in various quarters regarding the seriousness of the rust situation with this species. Rust control and fire protection are intimately concerned in actual practice, since it is maintained by some that burning is essential to prevent extensive mortality from the fungus, and nothing but an adequate knowledge of the rusts themselves can settle the matter one way or the other.

Insects. Dr. Craighead and Mr. J. A. Beal spent several days with Barrett and Gemmer on the Choctawhatchee Division of the Florida National Forest, collecting samples from normally pitchy faces, severely scraped faces, "dry-faces," and burnt faces to determine the relative damage done behind these various types of faces by Buprestid beetles. These heartwood borers have done an immense amount of damage to longleaf on the Choctawhatchee Division and the situation with regard to sales of turpentined timber is serious. The only definite find to date is that the ordinary American faces showed something like 50 per cent to 85 per cent infestation, whereas the extremely narrow French faces showed about 4 per cent.

Wakeley collected May beetles in the Bogalusa nursery, and obtained fresh tip moth material from both slash and loblolly plantations. Tip moth infestations as early as March throw an interesting light on the life history of the species in the region.

Forbes' contribution to the month's entomological collection consisted of longleaf leaves from a considerable area of badly browned trees near Natchitoches, Louisiana. Many of the needles were hollowed out for the outermost third of their length by leaf miners. The damage, first noted by Ashe, was widespread, and must reduce very considerably the effectiveness in food-production of last year's foliage.

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CALIFORNIA FOREST EXPERIMENT STATION

General

In spite of an unusual but typical California winter of heavy precipitation, field work will be started early in April.

Management submitted working plans for areas on the Modoc, Tahoe, and Eldorado, the Station checking growth and prediction data used in these plans.

Ranger Tyler has been permanently assigned to Feather River, one of our important centers of work. Siggins assisted Tyler in preparing seed and transplant beds and setting up meteorological stations. Through the generosity of some of the other Districts we hope to set out about 15,000 transplants this year.

Professor Mulford, of the Division of Forestry, recently returned from Europe, where he spent a year visiting the important forest regions and stations. As a result of his studies abroad the curriculum of the Forest School and the activities of the teaching staff are being critically reviewed and discussed in a series of conferences. The first of these was called recently, to which the entire Station staff was invited. President Campbell of the University, and Dean Merrill of the College of Agriculture took a very active part in the deliberations. Of the major problems discussed the two important ones were "How far should the School train in craftsmanship as against more adequate preparation in the basic sciences", and "The place of research in the schools." The gist of President Campbell's remarks was that training in the basic sciences is of first importance; the teaching staff must cross the "border" by actually participating in real research; the schools must prepare leaders for forestry twenty-five years hence.

Southern California

Kotok and Kraebel had a 10-day round of handshaking, meeting with the important organizations and individuals through southern California. Cooperative plans with the Los Angeles County forestry department for support of the work at Devel's Canyon were finally perfected. Fifteen hundred dollars was set aside for our immediate use with the probability of a thousand more if needed. Next year's budget will specifically include a $2500 item for cooperation.

Arrangements were made for starting the cover type survey in Los Angeles County in May. Two or three parties will be placed in the field, using cooperative funds for this work. The timber types will follow the Forest Service standard classification. The brush types will be segregated into at least 10 or 12 distinct divisions, based on principal species present. In order that this information can be applied in a hazard and liability survey, the types will be further subdivided as to density and height of brush cover, the amount of leaf mold and humus. Natural fire barriers, rock outcrops, and other pertinent data of use in fire protection will also be shown. In this way the map will be of immediate use to the administrative organization in planning fire control.

Nursery work at Devil's Canyon is proceeding with fair success. About 55,000 transplants, chiefly from the Altadena Nursery of Los Angeles County, have been set out. Three standard seed-beds have already

been sown, and an overhead sprinkling system will be installed in April. About An arboretum has been started with about 300 trees, representing 36 species.

Strange things may be expected in southern California. Ordinarily we think of the territory as an umlimited brushfield, yet Kraebel's first job was a thinning study. About 20 years ago a plantation was set out on a firebreak near Mt. Wilson. A 4 x 4 spacing was used and most of the stock survived. This is chiefly of a knobcone pine plantation with a small mixture of deodar cedar, and Jeffrey and Coulter pines. The administrative organization, desiring to protect this plantation, built a 40 foot firebreak on all sides of the plantation. The thinning is rather unusual in that it does not accelerate growth but is primarily designed to reduce the fire hazard within the plantation by removing all of the dead and suppressed trees and to pruning branches up to 4 feet, still trying to maintain a closed forest. Varying degrees of opening up of the stand will be tried to determine the effect of exposing the forest floor and of the ability of the plantation to withstand winds. The suppressed deodar and Jeffrey pine will be released.

The County Forester of Los Angeles County has purchased a 60 H.P. tractor for fire line construction. Arrangements have been made for a cooperative experiment in removing the brush with this tractor and a Super Mogul grader in preparation for field planting this fall.

Experimental Forest

The Office of Management, in cooperation with the Station, will examine the Butterfly Valley Unit near the Feather River center of work for the purpose of setting aside this area as the first unit in an experimental forest. This consists of about a half townsnip of land of which 50 per cent is in private ownership. An operating lumberman controls the private stumpage but indicates his willingness to consider pre-cutting agreements on his own lands if he can secure the adjacent Government timber. This area in itself can not be handled on a sustained yield basis but will afford an opportunity of trying out different silvicultural systems from clear cutting to the shelterwood. A few sample areas of virgin forest will be left intact. This area is immediately adjacent to the Feather River Station and will form an important part of the proposed larger experimental station.

Cover Type

Wieslander has been working up cover type data for the Central Pacific Railroad lands from original records and maps loaned by the company.

Library

Dunning, in spite of crowding through on two manuscripts, has found time to organize our library. The Station is making considerable progress in assembling a working library. About 500 volumes have been

acquired by transfer without any cash outlay. New Stations, or others interested in completing sets of Forest Service bulletins, might be interested in knowing that the Coronado Forest has a list of about 1100 bulletins, reports, etc., which it desires to dispose of. The California Station has hopes of assembling a very complete bibliography on forest influences, as this is essential for its big problem in southern California.

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PACIFIC NORTHWEST FOREST EXPERIMENT STATION

The Regional Investigative Committee held a very successful annual meeting on March 8-10 upon District Forester Granger's return from Washington. The discussion was unusually constructive. Much discussion centered about fire studies and slash disposal but all topics touched by Forest Service research were considered. A feature of this Committee's work which was given much attention prior to the meeting by a subcommittee was the selection and assignment of minor studies for the Forests. The report was mailed to Washington one week after the close of the session.

An administrative audit of the Station was made by Mr. Weil of the District Fiscal Agent's office in accordance with the practice followed of inspecting periodically all Supervisors' offices in the District. This audit will help us in bringing our practices strictly in accordance with procedure, but we were gratified upon reading the auditor's report to see that he found our clerical and accounts work in excellent shape and had practically no matters to criticize and many to compliment us for.

The following summaries show field travel in 1926 of the yearlong members of the Station staff. The number of days in the field was as follows: Munger 63, McArdle 71, Isaac 106, Meyer 86 (after coming to the Station in June), Westveld 209, Simson 16 (exclusive of his seven months' residence at Wind River); average 107 days per man. The daily cost for meals and lodging in the field varied with each individual from $2.00 to $2.82. Most of the travel was by automobile.

The House and Senate of the Washington Legislature passed a bill appropriating $45,000 (for two years) for forest research in the State of Washington to be available to the University of Washington Forest School for both products and silvicultural studies. The Station was about to draw up a program for cooperation with this State research agency at the request of Dean Winkenwerder when we learned that Governor Hartley had vetoed the bill.

It is an interesting result of our fire studies that insurance companies are taking an interest in them and sensing their importance to their business. This month we had another caller who was eager to learn how much had been obtained in rating hazards, particularly the climatic hazard, in different regions. The insurance companies are going to be a mighty influence in raising the standard of fire prevention in the woods

but their business cannot be stabilized until they have a better means of rating hazards and knowing what precautions should be insisted upon.

To get the necessary arboretum work done at Wind River at the very opening of the season Munger, Meyer, and Westveld spent three days there. We distributed surplus stock to a number of other forestry agencies and in return have received consignments of seed or trees which have greatly enriched our collection.

Simson took up residence at Wind River on March 26 and will have the seasonal fire weather instruments in operation on April 1. Thomas Van Meter, a graduate of the University of Montana Forest School, has been assigned to Wind River as field assistant on fire studies, the local Douglas fir natural reproduction plot work, and arboretum and forestation studies.

McArdle spent most of his time on the Douglas fir yield manuscript, which is now beginning to take form. During the month he prepared "An Outline for Forest Fire Research in Oregon and Washington" which will serve, after some revision, as a guide in organizing the fire studies program.

Westveld read a paper, "Suggestions for a Slash Disposal Policy in the Yellow Pine Forests of the Northwest," at a March sectional meeting of the Society of American Foresters. The paper pointed emphatically to benefits to be derived by leaving slash, and to the necessity of flexibility in slash disposal to meet the variable forest conditions. In conclusion a policy for National Forest lands and one for private lands which would give maximum results in silviculture, fire protection, and cost was outlined. A lively discussion followed which brought out the disadvantages of slash burning, the excellent opportunity for effective fire protection without complete disposal, and the absurdity of expending large sums of money for piling and burning when other remedial measures are possible. It is believed that the meeting went a long way toward picturing slash as a benefit as well as a nuisance, and that it has developed a new slash disposal viewpoint. Westveld is devoting most of his time now to writing a manuscript embodying the final results of the slash disposal study.

A variety of late season office work kept Meyer busy the whole month working on the understocked Douglas fir yield project, revising the permanent sample plot report, and making plans for the coming field season, during which it is hoped that the yield table will be put into application on a large area of immature Douglas fir with the cooperation of the District Office. A progress report on the nature of understocking in second growth stands of Douglas fir, besides bringing out those things which have been stated in previous station reports, tells how the examined stands, exclusive of large holes, average approximately 90 per cent of the yield tables in stocking; that maximum values seem to be reached on slopes ranging 30 to 50 per cent; that number of tree tends to normality at a rate of about 2 per cent every five-year period in understocked stands; that the effect of site upon deviations from the normal is inde-

finable; and that the greatest cause of understocking is fire, while windthrow and insect damage are of little importance.

Isaac spent the month working up the file records of the past season's observations on the western white pine liberation thinning plot, seed dissemination studies, seed storage in the duff, and germination in the virgin woods. In connection with the latter it is interesting to note that only a very small per cent of the seed sown produced seedlings under a mature stand of Douglas fir. After two germinating seasons a total of only one per cent of the seed sown on the surface and that placed under an inch layer of duff produced seedlings. Ninety-nine per cent of the seed still lies in the rodent-proof enclosure unaccounted for, and the fact that the per cent of germination was much lower the second year than it was the first indicates that much of the seed has germinated and died without producing seedlings, or has lost its viability through deterioration.

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NORTHERN ROCKY MOUNTAIN FOREST EXPERIMENT STATION

March marked the end of Wahlenberg's work at the Northern Rocky Mountain Station. He left Missoula on March 30 to join the Southern Station staff, to the regret of his friends in District 1. His last month was a busy one for, aside from 10 days' closing-up work at Savenac Nursery, he finished the last of his two longer reports, prepared a memorandum on the status of numerous minor projects, and completed many miscellaneous office jobs in connection with planting research. Weidman put in a solid week reviewing and revising reports with Wahlenberg, and in matters dealing with the general wind-up of his work. One of the last manuscripts to be finished gives the results of the fertilizer experiments which have been conducted at Savenac Nursery during the last 10 years. More than 30 different fertilizers were tested and their efficacy carefully rated according to their beneficial influence on root and stem development, top-root ratio, and yield of seedlings and transplants. The one which came out first by this system was a commercial fertilizer with the trade name of "Dia Lawn Dressing." An analysis by the Bureau of Soils shows this to contain 9.8 per cent phosphoric acid, 4.59 per cent nitrogen, and 0.87 per cent potash. Following it in effectiveness came blood and bone, ammonium sulphate, dried blood, vegetable fertilizer, and potassium nitrate.

The lightning study and weather compilations occupied much of Gisborne's time during March. In the latter work he received assistance through assignment to the Experiment Station for several weeks of Forest Examiner Sutton and Lumberman Standiford of the Lolo Forest. On March 15 Junior Forester Day of the Nezperce arrived for a month's detail on weather compilations. About this time also Gisborne gave a three-days' series of lectures on Forest Experiment Station work at the University of Idaho Forestry School.

An interesting point brought out by Gisborne's report on fire be-

havior in relation to weather conditions on the Quartz Creek fire is that, for once, a really large fire (attained 18,000 acres and burned 28 days) occurred conveniently close to a completely equipped weather station. The edge of the fire was about one and one-half miles from the Priest River Station - too close in the opinion of the members of the Station staff. This proximity, however, permitted a close check of weather records with the day-by-day spread of the fire, and greatly amplified the instrumental observations Gisborne was able to make directly on the fire line. The results of the study will shortly appear in an article in the Monthly Weather Review entitled "The Meteorological High Lights of the Quartz Creek Fire." Briefly, it may be stated that, with a general condition of low humidity and high temperature, the intensity of fire-spread varied most with wind velocity. Gisborne was able to divide the period of the fire into what he has called, for the want of better terms, 21 easy days and 7 bad days. On the former the fire-spread was at the average rate of only 400 acres a day and on the latter at the rate of 1370 acres a day. The following table gives an idea of the wind, temperature, and relative humidity conditions which prevailed on these days:

	Rel. humidity: av. min. per cent	Temperature: av. max. degrees	Average Wind Velocity m.p.h.: Daily 6 p.m. - 6 p.m.	Afternoon Noon - 6 p.m.
The 21 easy days (av. spread 400 acres a day)	20.1	81.7	4.8	8.1
The 7 bad days (av. spread 1370 acres a day)	18.4	80.6	7.0	11.5

Haig reports from Washington that good progress is being made on the white pine yield computations. An idea of the immensity of the present day yield study job is given by his statement that the volumes to be entered on the yield study cards have required over 50,000 multiplications, and that a battery of four Marchants was used on this work for ten days. The punch cards of the yield study proper, of which there will be about 13,600, are two-thirds punched and verified. Haig hastens to correct a statement made in the last monthly report that only six new volume tables must be made in preparing the yield tables. Actually, 18 volume tables are being constructed: a cubic, a Scribner, and an International table for each of the six species which commonly make up western white pine stands.

Marshall continued his efforts in cleaning up office work on various projects, devoting most of March to compilation of data for the white pine thinning plots, and to volume computations of Weidman's yellow pine sample plots.

Marshall gave a little time to a paper entitled "Influence of Precipitation Cycles on Forestry" submitted to the Journal of Forestry and previously delivered before the local section of the Society of American Foresters. The paper points out rather strikingly some of the influences on reproduction, yield, and fire protection not ordinarily considered by foresters. It also upsets, for the western white pine region at least, the conventional idea of a normal growth curve which, it will be recalled from classroom days, rises steeply for the early period of rapid growth and falls off gradually to old age. By measuring the diameter growth of dominant trees in five different stands varying in age from 75 to 280 years, Marshall found that their growth was not similar in similar age periods of the life span of the trees. This was attributed to the influence of precipitation cycles of approximately 40 years duration. For example, if a wet cycle occurred in the period when a tree was 30 to 70 years old, a sharply rising curve of diameter growth resulted for this period, but if a dry cycle coincided with this age period of the tree, a descending diameter growth curve was the result. Likewise, a wet cycle occurring in the middle life of a tree, even as far along as 170 years old, would cause a very marked and long-sustained increase in diameter growth.

Miss Peterson, the Station clerk for the last five years, left at the end of March for a furlough of six months. Trouble with her eyes during the last few years has caused her ill health which requires a protracted period of rest.

ROCKY MOUNTAIN FOREST EXPERIMENT STATION

March Activities

Nearly all of Roeser's time in March was spent on the preparation of data for a lodgepole pine taper table, needed by the District for estimating the pole, tie, and prop contents of stands. The immediate need arises from the interest of telephone companies in lodgepole as a long-pole tree.

Bates returned to Colorado Springs at the middle of March to put in final shape the Wagon Wheel Gap report on which most of his time in Washington had been spent. The careful analysis of the data, which has now been completed, has entirely altered most of the deductions which were drawn from current study of the post-denudation records, as will be seen by the brief summary. The experiment substantiates the viewpoint of foresters far more than has been supposed, showing the forest to be a waster of water only through the interception of snow.

Roeser will complete the lodgepole taper tables before taking to the field. The Engelmann spruce volume table data, which are now completely summarized, will be sent in to the Section of Computing for the actual building of the table. Since there is very little planting work at Fremont this spring, field activities will begin somewhat later than usual.

Bates will now begin to clear his desk of matter accumulated through the winter, the most bulky of which has to do with the growth-prediction studies which are being completed for cut-over areas of several Forests. Revision of the general growth-study report, a report on lodgepole pine reproduction, and the summarizing of all soils data collected to date stand next in line. There is little prospect of these jobs being completed before early June.

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SOUTHWESTERN FOREST EXPERIMENT STATION

Mr. E. E. Horn of the Biological Survey arrived March 15 to resume his work on the control of the porcupine. Poison baits placed in rock crevices last fall have claimed quite a number of victims. Seven dead "porkys" were found in one canyon. Horn's theory that the animals migrate along certain ridges from the lower to the higher country, and vice versa, seems to be working out. Great numbers are found along these supposed lines of travel. Twenty-seven were shot in a single day and a bag of from 15 to 20 is not uncommon. A man has been employed to spend the summer hunting and putting out poison.

The top of a yellow pine sapling was brought in from Tuba City several days ago. It represents three years' growth and measures 73 inches or a little better than 2 feet a year. Tuba City is at an elevation of 4500 feet and summer temperatures get well over a hundred degrees. The trees stood along an irrigation ditch.

The report on forest types has been revised and submitted to the Forester. If it gets by the editor it should appear in print in the course of perhaps a year.

McIntyre's report on his study of brush disposal is being revised with a view toward publication.

Our clerk, C. G. Wittorff, has resigned on account of ill health. Arrangements have been made to transfer Mrs. Fleming, an experienced clerk on the Gila, to the Station effective April 15. In the meantime the technical men are experiencing some unpleasant reminders of their clerical shortcomings.

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MANUSCRIPTS RECEIVED

Northern Rocky Mountain

"Influence of Precipitation Cycles on Forestry." Robt. Marshall.
(To Jour. For.)

Southwestern

"Forest Types and Climate in Arizona and New Mexico." G. A. Pearson.

Appalachian

"Investigative Report and Program for 1926 and 1927."

"Forestry Possibilities in Southern Appalachian Hardwoods." E. H. Frothingham. (Read at Ninth Southern Forestry Congress, Jacksonville, Fla., March 23, 1927.)

Lake States

"Rating of Fire Risk." J. A. Mitchell. (To "Smoke Screen")

"The Problem of the Pulpwood Supply in the Lake States." Raphael Zon. (For a paper trade journal.)

"Improvement of Swamps for Forestry." A. E. Wackerman and L. F. Livingston. (Jour. of Soc. of Agric. Engineers.)

"Thinning of Young Red Pine." Joseph Kittredge, Jr.

California

"Cover Type and Fire Control in the California Pine Region." Show and Kotok. (Dept. Bul. or Circular.)

Pacific Northwest

"The Lumber Merger and Forestry." T. T. Munger. (West Coast Lumberman.)

"Office Report on Study of Relation of Stocking to Stand Characteristics." W. H. Meyer.

"Suggestions for a Slash Disposal Policy in the Yellow Pine Forests of the Northwest." R. H. Westveld. (Read at Soc. Am. For. meeting, March 25.)

"Douglas Fir Has Long Seasonal Seeding Period." L. A. Isaac. (Annual Cruise O. A. C.)

IN PRINT

Dana, S. T. "Forestry and the Society." Jour. For. Feb., 1927.

Koroleff, A. M. "Improving Timber Bucking Technique." The Timberman, February, 1927.

Forbes, R. D. "The Next Generation." Jour. For. March, 1927.

Kittredge, Joseph,Jr. "Review of Relation of Birds to Woodlots, W. D. McAtee." Jour. For. March, 1927.

Roeser, Joseph, Jr. "Review of the Transpiration of Our Forest Trees by Hans Burger." Jour. For. March, 1927.

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RE, Census - Wood Preservatives

In connection with this project the second request was mailed on March 12. At the close of the month returns had been received from all but twenty-five of the cooperators.

Special Association List

At the close of the month replies had been received from all but about ten of the various lumber manufacturing, wood-using, and allied associations, and it is expected that the list will be ready for distribution early in April.

Cooperation - Federal Specifications Board

The Federal Specifications Board was formed some four or five years ago to prepare specifications for the use of Government officials in purchasing supplies. The preparation of specifications is undertaken by various committees appointed by the Board. The Forest Service has taken an active part on three committees dealing with wood preservation, containers, and lumber grading.

Specifications for wood preservatives and methods of treatment were completed early in 1926, approved by the Board, and have been in force since July 1, 1926.

Specifications for wooden and fiber containers have been prepared in tentative form. Those for wooden containers are in final form so far as the Forest Service is concerned, and it is believed that they will soon be approved by the Board. Those for fiber containers are well advanced but not in final form.

Specifications to govern the purchase of lumber by the Government were submitted to the Board a few weeks ago. They are now being circulated among the Government Departments and it is expected that they will be approved and go into effect early this summer. The lumber committee was formed about two years ago and has concerned itself largely with bringing about in the various Government Departments the use of commercial specifications based on American Lumber Standards instead of the preparation of different specifications by each Department. Commercial lumber specifications are now largely used by the Government so the adoption of the master specifications recommended by the Lumber Committee of the Federal Specifications Board will not make nearly as much of a change as would have been the case several years ago. The gradual introduction of the methods of purchase contained in the master specifications by a process of infiltration will, it is believed, render the final adoption of the specifications by various Government organizations practically painless.

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Lumbering Manufacturing Costs - 1926

During the month, this office in connection with Logging Engineering collected lumber manufacturing costs for 1926 from 33 of the band mills in the Inland Empire. Although the regional sawmill cut was considerably less than that for 1925, the following costs are based on more than a billion feet:

	Pond to pile	Pile to car	Over-head	Total 1926	Total 1925
I. White Pine	$3.83	$4.86	$3.12	$11.81	$11.62
W. Yel. Pine	4.29	4.24	2.81	11.34	10.76
Larch-fir	3.77	3.78	1.95	9.50	9.93
Total - all mills	4.00	4.36	2.72	11.08	10.97

Lumber Census - 1926

Satisfactory progress can be reported on the project. The canvass for the two States is 85 per cent complete, there being but 47 delinquents in Montana and 51 in Idaho at this time. As a large majority of the big mills have made their returns, statistics for more than 85 per cent of the annual cut are probably now available. A shipment of about 475 schedules is being forwarded to Washington. These have all been edited and the data tabulated.

Lumber Prices and Movement

Av. Mill-run Prices - Annual	1923	1924	1925	1926
Idaho White Pine	$48.85	$39.20	$37.37	$37.77
Pondosa Pine	34.88	28.16	28.02	26.33
D. Fir & Larch	22.39	19.50	19.33	17.78
White Fir	24.65	22.52	20.14	19.10
Spruce	30.67	25.53	24.28	23.73

	February, 1926	February, 1925
Cut	94,202 M	80,454 M
Shipments	123,905 M	117,506 M

Miscellaneous

A first draft of the proposed bulletin, "The Air Seasoning of Western Softwood Lumber," was completed during the month and copies sent to

Districts 5 and 6 for their review and criticism. It is hoped that the manuscript can be revised, as a result of such reviews, in time to discuss the proposed publication with Mr. Clapp during the annual program conference at Madison during May.

Mr. Bradner spent practically the entire month collecting smaples for the Laboratory's "Moisture-Content" project. Mr. French assisted in this work for about two weeks, stopping off in this District on his return trip from the West Coast.

A further revision of the Bureau of Census Biennial Timber Products schedule was made to harmonize the views of Districts 1, 5, and 6. It is planned to discuss this matter with the Branch representatives at the time of the spring program conference. If at all possible, a Bureau of Census representative should be present for such discussion.

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OFFICE OF FOREST PRODUCTS - DISTRICT 6

Wood Technology

Several lots of wood samples were identified for the California White and Sugar Pine Manufacturers Association, these being samples taken from ancient buildings in an endeavor to obtain data upon the durability of California woods.

A determination was made for the Pacific Telephone and Telegraph Company of white oak in dispute as to conformity with their specifications. An interesting point in this case had a direct bearing upon the origin and development of tyloses.

There were also submitted by the Claims Agent of the Pacific Steamship Company samples of shavings substituted in transit pilfering for textiles imported from Europe. The determination whether the wood species represented by the shavings were American or European would establish a presumption as to whether the pilfering occurred before or after arrival in this country. Samples were submitted to the Forest Products Laboratory. Mr. Brundage, however, was able to determine pretty certainly the presence of southern red gum. There were also white oak shavings, which it would not be possible to say in themselves whether they were of European or American origin but which the presence of the red gum indicated as probably American.

There was also brought to this office a fragment of root wood which seemed to be of some brush species, which was encountered like the sequoia which we have, in running a tunnel, in a tertiary gravel deposit beneath the lava cap. No determination of the species has as yet been made.

We have also received an exceedingly interesting collection of samples from the timbers originally placed in 1815 in the old Santa Barbara mission. Some of these which had been supposed to be redwood were found to be big cone spruce (Pseudotsuga macrocarpa), doubtless obtained from the neighboring mountains. The bell tower timbers were, however, of some foreign wood as yet undetermined, but presumably brought up from Mexico.

Moisture Content Project

Mr. Brundage was on field work in this project during the first half of the month, and spent some further time in connection with computations and arrangement of the data. A total of over 6,000 samples were gathered in this District.

Destructive Agencies

Examinations were made and suggestions offered to two San Francisco firms experiencing trouble with insect attack on stored lumber. One case involved powder-post beetles, and the other white ants.

Considerable time was given with Dr. Meinecke to review and drafting of suggestions for revision of building code provisions for protection from white ants and decay drawn up by Dr. Snyder of the Bureau of Entomology for the Pacific Coast Uniform Building Code which is now under preparation by the Pacific Coast Building Officials Conference.

Mill Scale Study

Mr. Brundage gave some time to assistance to Forest Management in respect to an endeavor by one of our large pine mills to upset the conclusions unfavorable to their mill practice which were arrived at in the mill scale study conducted by the two offices last October.

Heptane

Considerable time has been taken by the negotiations through the Forest Products Laboratory and Professor Kremers at Madison, and later in the month directly with the Ethyl Gasoline Corporation of New York, respecting the possibility of establishing an efficient operation in National Forest timber for producing Jeffrey pine heptane. At the close of the month the prospect looks really favorable for definite accomplishment.

Lumber Census

At the end of the month 80 per cent of the census schedules of this District have been returned. An advance estimate made at the request of the Census Bureau and based upon reports from identical mills for 1925 and 1926 together with the estimates of the two lumber associations, indicates 1926 production in excess of 1925 of 11 per cent

in the pine region, 3 per cent in the redwood region, with an average increase for the State of 8 per cent.

California Economic Research Council

Mr. Hill attended a meeting of the Executive Committee on March 4. Gratifying progress was reported in a number of important lines. Besides Mr. Hill's Committee on Natural Resources, there is special interest for the Forest Service in the progress of the Industrial Committee which has secured agreements between the Bureau of the Census and the agricultural and industrial divisions of the State government which will make important improvement, at least in this State, in the conduct of future industrial and agricultural censuses.

Supervision

Allotment increases have been received for the Products Office which make possible trips during the present fiscal year by Mr. Brundage both to Madison and to Districts 1 and 6, the latter in connection with the methods of conduct in those Districts of woods and sawmill waste studies which will also be inaugurated by this District next year.

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OFFICE OF FOREST PRODUCTS - DISTRICT 6

Resignation

Mr. Koroleff, who has been assigned with the general woods waste survey in the Douglas fir region, has resigned to accept the position of forester with the Canadian Pulp and Paper Association at a considerable increase in salary; he leaves the Service April 30.

Although Mr. Koroleff has worked with us but a short time (less than a year in the District), he has demonstrated his special ability in wood waste research. Much as we regret his resignation, we are glad that he has an opportunity to work in what he considers a more useful and attractive field.

General Survey of Woods Waste in the Douglas Fir Region

The computation of field data was continued and completed during March. It is difficult to summarize the results of the past field season into a paragraph or two, but the following may be of interest:

The original stand of timber on the 77 sample acres (11 companies) studied averaged about 100,000 B.F. per acre. The average amount of waste material left in the woods amounted to 20,453 B.F. per acre or 20.7 per cent of the original stand of timber, segregated as follows:

Woods Waste	Average Acre
Volume in slash	17,590 B.F.
Waste length in high stumps	1,838 B.F.
Volume in trees left standing which will be killed *	856 B.F.
Sound material in standing snags	169 B.F.
Total	20,453 B.F.

*Seed trees were not included in this figure.

The company on whose lands the greatest amount of material was found left on the average 33,108 B.F. per acre. The company on whose lands the least amount of wood was found left 10,675 B.F. per acre. Based on per cent of original stand, however, neither of these companies headed or ended the list. Judged from this angle the greatest amount left was 32.7 per cent and the least amount 11.1 per cent.

Since the survey is only about 50 per cent completed the results of last season's work can not in any way be considered as final, but, nevertheless, they point to some very interesting conclusions which will no doubt be strengthened by the study of 12 to 18 additional companies this season.

Lumber Census

Based on identical mills representing 65 per cent of the total output, the 1926 lumber cut of Oregon and Washington shows an increase of about 9 per cent over 1925. This means a total cut for the two States of 12,258 million board feet, as compared to 11,243 million in 1925.

The Douglas fir region of western Washington and Oregon, which produces about 85 per cent of the lumber cut of the two States, shows an increase of nearly 11 per cent, and the cut of the pine region of eastern Oregon and Washington decreased about 4 per cent.

The estimate indicates that Washington produced 7,832 million feet in 1926, an increase of over 11 per cent; Oregon, 4,426 million feet, an increase of 5 per cent.

Washington is the leading lumber-producing State, Oregon ranking second. Their cut has been climbing for years; 5,640 million feet in 1915; 8,842 million in 1920; 10,544 million in 1923; 11,243 million in 1925; and 12,258 million estimated for 1926. They now produce about one-third of the total lumber cut of the United States.

Washington Wood-Using Industries Report

The revision of this report, for publication by the West Coast Lumberman, was pushed during the month. The original plan provided for publication of the report by the University of Washington, but this, for one reason or another, the University was not able to do.

The West Coast Lumberman will furnish 1,000 reprints; in addition, it is hoped that a plan can be worked out whereby additional copies of the report will be made available to the public.

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RANGE RESEARCH

WASHINGTON

In accordance with instructions as set forth in Mr. Sherman's memorandum of March 26 the Office of Grazing Research has been changed to the "Office of Range Research," such change becoming effective April 1. There will be no change in the file designations, however.

Investigative Programs

From a grazing research standpoint March started the annual ball of handling the programs rolling when the Southwestern was considered by Mr. Clapp, the office chiefs, and Inspector of Grazing R. R. Hill from Grazing. The report shows highly satisfactory progress is being made in each unit and excellent correlation of the work, especially that of Cooperrider and Copple with the Southwestern Forest Experiment Station. It is planned to handle all the programs earlier than has been possible in the past few years. The great Basin Experiment Station program is next on the schedule.

Proposed Range Exhibit for International Livestock Exposition

The Exhibit Committee of the Department has tentatively approved two range features for the Department's exhibit at the International Livestock Exposition to be held in Chicago in the early winter. The first feature will illustrate overgrazing and proper utilization on cattle range based largely on the Santa Rita Range Reserve results showing profit and loss under these degrees of utilization and outlining the factors affected. The second feature will illustrate ranch organization based on the cooperative range survey in the Northern Great Plains made by the Bureau of Agricultural Economics, Bureau of Animal Industry, and the State Agricultural Experiment Stations of Montana, North Dakota, Wyoming, and South Dakota.

Series of Notes on Range Management

Mr. D. A. Shoemaker, Inspector of Grazing in District 3, is running a series of notes in the Daily Bulletin of the Southwestern District covering important phases of range management, aiming especially to interest the administrative organization in the possibilities of applying research results to administration.

Forage Investigations

During March 569 plant specimens, representing 15 collections, were forwarded to the Bureau of Plant Industry for identification. Two collections were reported back to the Districts. About 700 mounted plant specimens were distributed in the herbarium, and 275 were mounted.

Darrow vs. Fragaria

On March 5 Mr. Darrow visited the office (not the one of the Leopold-Loeb and Scopes trials, but George M. Darrow, associate pomologist of the office of Horticulture, Bureau of Plant Industry). Mr. Darrow is interested in the genetics, horticulture, and taxonomy of strawberries, and is eager to get Forest Service field men to get him living plants of promising native strawberries for breeding work at the experimental grounds, Glenn Dale, Maryland. Mr. Darrow went over our herbarium collection of Fragaria and took copious notes therefrom. We furnished him with a checklist of all our Fragaria material, less than half of which is mounted and distributed in the herbarium, and probably not over two-thrids is available in this office.

Leonard's Monograph of Scutellaria

During the month there appeared from the press a monograph of North American skullcaps (Scutellaria), Contributions from the U. S. National Herbarium, vol. 22, part 2, by Mr. Emery C. Leonard of the U. S. Museum. Scutellaria is not an important genus in our range plant work, - numerically or economically. However, we have about 40 sheets of skullcaps in the local range plant herbarium. Dayton wrote Mr. Emery about his not having gone over our material ere issuing his monograph. Mr. Emery expressed great interest; said he had not known of the existence of our herbarium, and promised to consult it in his future work. We promised him several range extensions at least. "It pays to advertise!"

Smith's Oregon Lupine Catalogue

Prof. C. Piper Smith of the San Jose High School, San Jose, California, and probably our foremost American student of lupines, has just published a catalogue of lupines of the State of Oregon. This is the first publication of a new botanical series, Contributions from the Dudley Herbarium of Leland Stanford University. Unfortunately Prof. Smith did not go over our Forest Service lupine material from Oregon before issuing this paper, apparently due to pressure of work. We have eight lupine species from Oregon National Forests that are not in Prof. Smith's list, as well as a number of "new species" suspected by the late Dr. Greene. Mr. Smith has expressed a desire to see this material (the nomenclature of which he will no doubt revolutionize), and it is being assembled for this purpose as rapidly as possible, seventeen sheets having been sent him already from this office.

Range Plant Herbarium Beginning To Have Outside Recognition

Prof. Smith has also written that he has reserved the number "70" for citations of specimens from the Washington office herbarium of range plants in his lupine monograph. Ingram of District 6 writes that Prof. Henderson wept when he presented him with a specimen of the practically unknown Oryzopsis hendersonii which Ingram rediscovered (and far from

the type locality), and that the botanists of the Northwest have shown amazement at the wealth of material that exists in the Forest Service range plant collections and at the lack of advertising which they have secured.

Mr. Tidestrom and Mrs. Chase Leave Us for Awhile

Service range plant collectors must be content with some little further delay in determination of their plant material inasmuch as the two persons in the Bureau of Plant Industry most concerned with such work have left us for a season. Mrs. Chase, the assistant agrostologist, sailed for Europe on March 25. Mr. Tidestrom left about the end of the month for Arizona, to work primarily in the collections of the University of Arizona at Tucson; his Flora of Arizona is about two-thirds completed. He has furnished us with a copy of the family key for this Flora.

Some Interesting Plant Specimens of the Month

Crook N.F. C. K. Cooperrider & R. F. Copple's no. F-32, serial no. 50440, Claytonia perfoliata Donn. Apparently a first record for Arizona.

Crook N.F. C. K. Cooperrider & R. F. Copple's no. F-33, Washington office no. 50448, Trifolium albopurpureum Torr. & Gray. A California clover! Would be a first record for Arizona and an enormous extension of range but for the fact that Dr. Kearney, Mr. Tidestrom states, has also recently collected this near the Mexican line in that State.

Crook N.F. C. K. Cooperrider & R. F. Copple's no. F-37, serial no. 50454, Fremontodendron californicum (Torr.) Coville. This is what Dayton originally called it, but Mr. Tidestrom keyed it out as F. mexicanum Davidson; as a result of a restudy of the specimen (Dayton taking the flower home at night and soaking it up for better examination) Mr. Tidestrom has decided to suppress F. mexicanum in his Flora and call this a synonym of F. californicum. A rare and interesting shrub or small tree in Arizona.

Jornada Range Reserve

Few plants are more characteristic or better known in the deserts of the Southwest than Ocotillo (Fouquieria splendens Engelm.), but strange to say the Washington office range plant herbarium has only now gotten a specimen of it. This is R. S. Campbell's no. 471, our serial no. 51410. It is interesting to note that Dr. Wislizenus collected the type of Ocotillo on what is now the Jornada Range Reserve, which is botanically rather historic ground. Dr. Engelmann described this species as having "Staminibus 15," while Wooton & Standley's Flora of New Mexico give "10," but Mr. Campbell's specimens frequently show 20!

Siskiyou N.F. D. C. Ingram's no. 1992, serial no. 53369, Oenanthe sarmentosa Presl (presumably the form known by some as O. californica S.Wats,= O. sarmentosa californica (S.Wats.) Coult. & Rose). Mr. Ingram's note with this specimen is interesting: "Moderately grazed by sheep and believed to be poisonous. Sheep losses on Easley ranch reported. This is the only suspected plant found." The specimen has not yet been determined in the Bureau of Plant Industry but is undoubtedly Oenanthe. The genus has no history as a livestock poisoning plant in the West so far as we are aware; however, as the genus has a very bad reputation in Europe, the European O. crocata, especially, being virulently poisonous - particularly to horses, it would seem not at all unlikely that the western O. sarmentosa and O. californica are fit objects of suspicion.

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JORNADA RANGE RESERVE

Range Conditions and Precipitation

The weather conditions during March have been very unfavorable to plant growth because of the slight amount of precipitation, the incessant west wind, and the low temperature during the nights. However, in spite of these adverse conditions some of the perennial grasses, especially Aristida and Sporobolus giganteus, have made some growth and the perennial weeds have made a surprising increase in height and volume. The annual weeds have germinated in great numbers, but owing to the drying winds which robbed the surface soil of its moisture, they have made very little growth.

The range as a whole is holding up well. The cattle of this locality are in good condition and the future looks promising. The stock on the Jornada are in excellent condition and there is a plentiful supply of forage. About 50 head of young calves have made their appearance in Pasture No. 1 since the first of the year.

Investigative Work

Compilation of data, maintenance work, and a utilization survey of Pastures No. 6 and No. 8 have taken up most of the time this month. The quadrat data show a considerable increase in quadrat density for the past season. An increase of 75 per cent for the main forage grasses is common, and an increase of 100 per cent is not unusual.

Improvement Work

The construction of the Pasture No. 9 fence was begun last week. This project includes the construction of about five miles of fence which will enclose 3,161 acres of excellent grama-type range to be used as a bull pasture. The regular construction crew is augmented by the presence of Mr. Waggoner, the Jornada cooperator, who has been on the job since beginning of the project.

Texas and Southwestern Cattlemen's Ass'n Convention

The 51st Annual Texas and Southwestern Cattlemen's Association Convention held at El Paso was attended by Director Schoeller March 15, and Canfield spent the evening of the 16th and the entire day of the 17th at the convention. The Fat Stock Show held in connection with the convention was not large but was very interesting.

Personnel

Director Schoeller, on leave since March 16, will visit the Santa Rita Range Reserve, the Boyce-Thompson Arboretum, and his old home at 2632 Kenwood Avenue, Los Angeles, California.

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SANTA RITA RANGE RESERVE

Growth and Precipitation

Growth progressed fairly well all over the Reserve during March, although continued low temperatures (ranging from 31 to 40 above zero) have prevented normal growth for this season of the year considering the amount of rainfall. At Florida Station the recorded rainfall for the month was 1.85 inches, raising the total for this year to 3.77 inches. The average over the Reserve was about one inch for March and slightly under three inches since January 1. Recent inspections of the various pastures indicate an abundance of last summer's growth still on the ground and the green feed coming on everywhere. Even with no further rain until May or June, cattle on the Reserve will come through the spring in good to excellent condition. Ruelas' stock is almost in marketable condition at the present time.

Browse species started to leaf out generally by the middle of March.

Salting

We have made arrangements with Parker to do all his salting for him and have already started a special salting study in pasture 18. This will be extended to pasture 1 and adjacent [illegible] Forest Range during April. Under this plan it will be possible for us to keep more accurate notes on utilization and the effectiveness of the salting plans. It is also hoped that we can secure some data on keeping stock away from Loco infested areas through proper placing of salt on the range.

Meetings

Preparations are completed for the Crook National Forest Rangers' meeting which is to be held on the Santa Rita during the week of April 4 to 9. Three days have been set aside for grazing and of these, two will be spent in field trips over the Reserve, and one in camp on

a general discussion of grazing investigations. The balance of the week is to be devoted to other Forest activities.

Visitors

Director Schoeller, from the Jornada, arrived on March 17 en route to California on his leave, and spent the two following days going over both field and office project work on the Reserve.

Messrs. Edwin B. Bartram and Leon H. Silbert, from the Smithsonian Institution, spent March 28 in collecting mosses up Florida Canyon and believe they have found several specimens new to science.

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GREAT BASIN STATION

Compilation of Data

Compilation of data is the order of the day and has been for the past three months. The presence of a great amount of uncompiled data of previous years has already been mentioned in the pages of this publication. Thanks to the kindly assistance of District 4 we are beginning to see some light where it seemed that little existed before. As the result of some savings in our own funds, and a few small contributions, we were able to take on an additional man, designated as Assistant Compiler, for several months this winter. District 4 seeing the gravity of the situation detailed Bert Lexen of the Weiser Forest and Edward Ritter of the Idaho Forest, both of the Junior Forester class, to the Station for a period of five to eight weeks to help out on compilation. With this extra assistance we are getting on the top of a great deal of back work. Although it will not be possible to get cleaned up, a big hole will be made in the stack of accumulated data this year. Several of the projects will be in shape by the end of the winter season so that progress reports can be prepared.

More Grief for the Taxonomist

Whither are we traveling in taxonomy is a question that naturally arises after reading Dr. F. E. Clements' chapter on ecogenesis in his "Researches in Ecology" (Carnegie Institution Year Book No. 25, 1925-26, p. 335-371). Dr. Clements has been taking species from one habitat and growing them in another to note the effect thereof. In reporting on the results he states, "In a number of cases the changes have equalled in degree the differences exhibited by valid species, and in some a species has been transformed into a facsimile of a related one, in technical characters as well as in general appearance. This has been accomplished for the second season in the apparent change (when transferring to alpine climate) of Phleum pratense to P. alpinum and of Epilobium angustifolium to E. latifolium. **** the alpine dwarf, Senecio taraxacoides, (was changed) in the shade of the montane forest into a form

scarcely distinguishable from the montane S. fendleri. This has involved the elongation of the stem from 2 cm. to 12cm. **** fleshy to thin leaves, the substitution of several erect heads for a single nodding one twice the size, the reduction of the rays from 13-15 to 7-8 and of their length from 14-20 to 7-8 mm. Adaptations of similar intensity have occurred in other alpine species, such as Veronica alpina, Erigeron uniflorus, Solidago virgaurea nana, Festuca brachyphylla, Trisetum spicatum and Luzula spicata!"

Undoubtedly such changes are occurring in species under natural conditions where the seed of a species is transplanted from one habitat to another. It raises many interesting points for speculation and may explain some of our difficulties in plant identification. We would like to hear some side lights on the proposition from our good friend "Daytonius."

(Forsling might have indicated that Phleum pratense holds its characters at alpine situations on the Manti. -- W.R.C.)

Climate and Plant Growth

Some time has been devoted to the study of distribution of rainfall especially with regard to the frequency of occurrence of "dry" years on spring-fall range in the region of the U. S. Sheep Experiment Station. Eight rainfall stations with records varying from 16 to 34 years were used for the study. Naturally the question of what is a dry year arose. The main growing season extends from May to September and precipitation during this period largely determines the size of the forage crop. But little information is available on what constitutes a dry season and an arbitrary value was assigned. Any season during which the rainfall was 33-1/3 per cent or more below the arithmetical mean was considered as being dry.

On the above basis it was found that for the region considered one dry season may be expected to occur in every four or five years. The average ratio for the eight stations was one dry season in every 3.82 years. This ratio varied among individual stations from a minimum of 1 : 2.71 to a maximum of 1 : 4.66. A check using the law of probabilities for one of the stations with a record of 34 years indicates the probability that a dry season will occur once in every 4.76 years. One dry season out of every four or five years indicates the importance of planning range management to meet the situation. The uncertainty of when the dry years may occur and the expense of feeding when the range runs short suggests the desirability of stocking the range on a conservative basis in the average year.

Snow Measurements

Snow measurements made on March 28 at the field station near Ephraim, Utah, indicate the heaviest winter precipitation on record since 1914. The average depth of snow at the headquarters physical factor station (elevation 8,850 feet) was 58.8 inches with water content of 17.81 inches. The mean for this date since 1914 is 50.9 inches depth

with an average of 14.28 inches water content. The maximum in any year heretofore for the last of March was a depth of 62 inches in 1920 and a water content of 17.20 inches in 1923. At the Alpine Station the depth was 73 inches with a water content of 21.16 inches. Indications are that there will be a heavy runoff this spring and plans are being made to establish a camp at the Alpine Station to obtain the record of runoff and erosion from melting snow in the erosion study the latter part of April, which is the time runoff usually begins. This is at 10,000 feet elevation and means quite a trip on snowshoes to get there. The trip, together with digging out the snow to prepare for turning the water through the weirs and handling the ice that forms during cold nights will doubtless emphasize the pleasantness of spending winter beside a warm radiator. The life of a "Range Researcher" is not all roses and incense.

Administrative Investigations in District 4

Assistant Range Examiner A. R. Standing, a graduate of the Utah Agricultural College, 1923, has been transferred to the District Office to take over the direction of "grazing studies." Besides direction of grazing reconnaissance and keeping a general check on the work of the technical grazing men assigned to forests for administration, Mr. Standing will handle the direction of the numerous investigations which are being conducted by administrative officers throughout District 4. Mr. Standing is filling the position made vacant by the promotion of James O. Stewart to Inspector of Grazing and Assistant Chief of the Office of Grazing in District 4. Junior Range Examiner A. L. Taylor has also been detailed to the District Office in Ogden to assist in handling the accumulated range plant work.

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RANGE RESEARCH - DISTRICT 3

Precipitation, in amount above the average for the winter months, has been productive below an altitude of 3,000 feet of a remarkable growth of winter and early spring vegetation. March, 1927 marks one of those exceptional seasons most likely to be remembered in the future in southern Arizona; a season longed for when the "unusual" but average dry year is with us.

The month has been given over to the compilation of data and current office and field work. Temptation to spend all the time in the field has been strong. The season, the vegetation, and the rainfall have created a situation ideal for the study of vegetation, forage utilization, water delivery, and erosion tendencies. It is one continual fight to hold project work to certain lines with changes occurring which influence the practical application of the work. Yet, one must reach afar sometimes to at least observe such things as will exert an equal influence with certain others for which an accurate answer is being sought in a solution of the whole.

In the semi-desert, herbaceous-annual, perennial-browse type, whether naturally covered mainly by annuals or the result of destruction of herbaceous perennials on ground formerly so occupied, the annual growth in a favorable season is extremely interesting. Ground that was barren a short time past and soon to be again, except for scattering shrubs and cacti, supports now a varying cover of annuals forming a .2 to .9 density of vegetation of fair to excellent palatability. The volume of growth is believed to be dependent, largely, on the moisture absorbing and retention qualities of the soil. The actual feed produced during seasons above the average in rainfall is probably comparable to that of high summer ranges. The yearly fluctuation is naturally much less in the higher altitudes.

Areas that should be largely producers of perennial vegetation, but through overgrazing have become dominantly annual are far less valuable in the annual state. In occasional years a great volume of feed is produced by the annuals but it usually lasts but a short period. Again annuals may produce nothing more than is necessary for reproduction, a size too small for grazing. Perennial grasses, common on such types, produce good volume in the spring under the same conditions that cause the annuals to be productive and also make a second growth in the fall. They can always be depended upon for some forage, at some time during the year, if conservatively used in years of plenty.

The value of winter annuals, such as alfilaria (Erodium cicutarium) often cuases an attempt to be made to artificially reseed the species beyond its present widespread range. Naturally such annuals are best adapted to desert range for use as winter forage in the absence of perennial, herbaceous vegetation. Such seeding attempts are most frequently made in locations where root grasses have been depleted through abuse and at altitudes not sufficiently warm to produce early spring growth. The winter annual then becomes a summer or late spring annual and winter feed is not secured. Probably the most valuable mission of the annual, so introduced, would be to prepare the soil to allow for a line of succession tending to restore the original cover. Close utilization of this annual forage results in continued exposure of the soil with a loss of fertility and moisture absorbing and retaining properties, built up during the perennial occupation. This seriously impairs the establishment of perennials and stimulates soil removal by erosion during the period the ground is not occupied.

The influences of physical and chemical characteristics of underlying and adjacent formations, in their relation to agricultural production, are ever impressive. Much work must some time be done to reduce speculation to facts in the broad field of influence of soils on forestry practices and in watershed conservation. Soils are particularly important considerations on National Forests, since we are dealing with a combination of natural and biotic influences and have not the control that is common in other forms of agriculture or in farm forestry. Probably soil dependency is nowhere more evident than in the watershed "forests" of the Southwest. Soil and geologic formation in the semi-desert type are known to be prominent among the determining factors in the natural retention or revegetation of an adequately protective vegetative cover. The utilization

of that cover by grazing animals is an influence, which, when allowed to overbalance the persistent properties of the vegetation, stimulates runoff that robs the soil of properties upon which vegetation is dependent and causes destruction of our watersheds and devastation of those industries sustained by a delivery of usable water. The effect of fire is similar but, unless of frequent occurrence, not so permanent as is destructive grazing.

Popular opinion is that the semi-desert has few possibilities of maintaining a comparatively good protective cover; that sand washes, gullies, devastating floods, gutted canyon floors, boulder bed drainage lines are its ear marks; and that destroying drought has ever been common. Some scientists have attempted to attribute the cause of recent excessive erosion to natural influences. Inexplorers' diaries, accounts of early expeditions have been cited in which certain points encountered were mentioned as to width of stream channel, height of stream bank or trenched flood plain. The forester has been inclined to believe that timber is the only effective watershed cover. Observations of much of the Southwest show very strong indications that the greater percentage of the erosion damage in the untimbered watersheds has taken place in relatively recent years, even during the period for which some weather records are available; that ecological change and decline from comparative normality of density of vegetation are very good yardsticks in constructing past and future; that no small portion of present deep-seated gullying has taken place within the memory of many of us and in a few instances is a matter of actual record. The old records and accounts examined have much more to say regarding luxuriant vegetation, stream flow, the dense cover of stream courses, feed for pack and saddle stock, game and fish, than they have of evidence of changes in vegetative cover. In a few instances equally authentic old records of those of the exploring parties relating to the kind of crossings at given points on drainage lines indicate that thousands of sheep had been grazed by the Spanish or Indians at these points mentioned for years prior to the date of the expedition, that stock were necessarily held close to the settlement on account of marauding tribes. These same points show but little to-day except desolation.

Investigations conducted to determine the relation of cover to runoff have found herbaceous vegetation, particularly the turf grasses, to be of high merit. Vegetative studies and observations under progress on typical semi-desert watershed forest areas in District 3 indicate: that a cover adequate at least to maintain balance and permanency existed within the last half century, as is frequently attested by those long familiar with certain areas; that adequate cover can be secured on depleted areas, the time requirement, all other factors equal, depending on the degree of depletion of original vegetation and soil.

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RANGE RESEARCH - DISTRICT 6

The early part of the month was spent on the innumerable details in connection with the District Investigative Committee Meeting, which was held March 15 and 16, and with the subcommittee on assignments of minor investigations to the different Forests. The 1926 Grazing Program was approved by the Committee for continuance in 1927. The Program includes the two major projects -

1. Grazing Management of Cutover Areas, and
2. Economic Importance, Distribution, and Natural Habits of Range Plants.

In addition two projects assigned to Forests -

3. Deferred Use of Mt. Meadows (on the Cascade, Mt. Hood, Mt. Baker, and Umpqua), and
4. Revegetation as a Result of Rodent Control Work (on the Ochoco in cooperation with the Biological Survey)

were stressed as District 6 problems of importance for which early solution is needed.

Period Studies, an administrative project, assigned to all important grazing Forests, was likewise approved for continuance.

With present limitations of funds and personnel for Range Investigations the Committee felt that for the present no new work should be initiated.

Minor Studies

In connection with minor studies work on the Forests in District 6 to date 92 enclosures have been constructed, 210 quadrats were charted, and 55 plant development records kept.

Herbarium

A new 3-section, 2-drawer, upright herbarium filing cabinet, built on the D-6 plan, has been added to the District Office equipment. This was sorely needed for filing the past several years' accumulated plant collections.

District 6 is looking forward to the publication of Mr. Dayton's bulletin on browse. One on herbaceous plants also is badly needed.

Range and Stock Conditions

So far indications point to a good grazing season in 1927 for the Northwest. There has been abundant snow in all mountain sections, well packed, with above normal rainfall and heavy thaws in February. The ground is saturated underneath, due to heavy rainfall last fall.

Feed is starting slowly and the season promises to be late, three weeks to a month later than last year, with better than average lamb and calf crops to date.

Liver fluke - an unheard of thing in Eastern Oregon - is reported by O. A. C. authorities in one or two bands in Grant County. Winter losses from all causes have been very light, and stock came through the winter in good condition.

Remainder of the month has been spent in preparation of the report on two years' work on vegetation and utilization, and in summarizing the phenological observations made on the Columbia in connection with the Grazing of Cutover Areas project.

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